

Rheological characterization of acylated and dextran conjugated African yam bean (*Sphenostylis stenocarpa* Hochst. Ex A. Rich.) proteins

Lawrence A. Arogundade^a, , , Catherine O. Eromosele^a, Ighodalo C. Eromosele^a,
Oladipo Ademuyiwa^b

^a Chemistry Department, University of Agriculture, Box 28 UNAAB Post Office, Abeokuta, Ogun State, Nigeria

^b Biochemistry Department, University of Agriculture, Abeokuta, Ogun State, Nigeria

Abstract

The molecular weight distribution and rheological properties of acetylated, succinylated and dextran conjugated African yam bean (*Sphenostylis stenocarpa*) proteins dispersion were studied. Succinylation of the protein showed the three prominent electrophoretic bands of the unmodified protein but all the bands disappeared with acetylation. Immobile band characterized dextran conjugated *S. stenocarpa* electrophoregram. The flow behavior indices (n) of these modified *S. stenocarpa* protein dispersions were in the range 0.03–0.22. This is an indication that they were pseudoplastic in nature. This pseudoplastic nature was maintained in ionic media 0.05–0.5 mol dm⁻³, pH 3–8 and temperature range of 27–75 °C. The yield stresses were 0.270, 0.302 and 0.320 Pa for acetylated, succinylated and dextran conjugated protein respectively. Activation energy of acetylated and succinylated protein were in the range 6.2–8.2 and 2–5.4 J mol⁻¹ respectively. Thus acetylation of *S. stenocarpa* protein made its dispersion viscosity more susceptible to temperature change than succinylation. These results suggest that acylation and dextran conjugation of African yam bean (*S. stenocarpa*) protein produce protein species with different rheological properties.

Highlights

► The rheological properties of modified African yam bean (*S. stenocarpa*) was studied. ► The flow behaviour indices of protein dispersions were in the range 0.03–0.22. ► The yield stresses of these modified proteins were in the range 0.270–0.320 Pa. ► Activation energy of acylated proteins were in the range 6.2–5.4 J mol⁻¹. ► Its dispersion viscosity became more susceptible to temperature change on acylation.

Keywords: *Sphenostylis stenocarpa*; Rheology; Succinylation; Acetylation; Dextran–protein conjugation; Electrophoresis
